

LAW, ETHICS, AND MEDICINE

Challenges in the provision of ICU services to HIV infected children in resource poor settings: a South African case study

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The HIV/AIDS epidemic has placed increasing demands on limited paediatric intensive care services in developing countries. The decision to admit HIV infected children with *Pneumocystis carinii* pneumonia (PCP) into the paediatric intensive care unit (PICU) has to be made on the best available evidence of outcome and the ethical principles guiding appropriate use of scarce resources. The difficulty in confirming the diagnosis of HIV infection and PCP in infancy, issues around HIV counselling, and the variance in the outcome of HIV infected children with PCP admitted to the PICU in African studies compound this process. Pragmatic decision making will require evaluation of at least three ethical questions: are there clinical and moral reasons for admitting HIV positive children with PCP to the PICU, should more resources be committed to caring for HIV children who require the PICU, and how can we morally choose candidates for the PICU? Those working in the PICU in HIV endemic regions need to make difficult personal decisions on effective triage of admissions of HIV infected children with PCP based on individual case presentation, availability of resources, and applicable ethical principles.

high HIV prevalence and describes current practice. It concentrates on evidence from sub-Saharan Africa where the epidemic is currently worse. However, with the rapid spread of the virus in South East Asia and Eastern Europe the questions we pose will soon become critical to paediatricians in other countries.¹

HIV ADMISSIONS TO THE PICU

King Edward VIII Hospital (KEH) in Durban is the main state hospital for paediatric referrals for the province of KwaZulu Natal, the epicentre of the South African HIV epidemic. This institution's principles of care are therefore governed by state resources and state obligations. The South African government spends 8.5% of the gross domestic product per annum on health. Of this 50 billion rand, only about half a billion is spent on HIV/AIDS care currently (education, social services, and health care);⁷ this despite the fact the greatest burden of ill health and death is caused by HIV/AIDS and related diseases.⁸ It is alarming that even in areas where a budget has been allocated for HIV/AIDS care, the money has not been spent and returned to the treasury.⁹ The PICU at KEH has eight beds and 400 annual admissions (120% occupancy). One bed day costs 1500 rand (£100), an annual course of prophylactic co-trimoxazole costs 34.32 rand (£2.28), and the average annual income per household is 6157 rand (£410). In a prospective study conducted in the paediatric wards at KEH in 2000, 60% of the approximated 1250 children admitted in the paediatric wards over a six month study period were HIV-1 infected.¹⁰ Most of these cases were infants presenting with acute lower respiratory infection; a fair proportion requiring intensive care. The number of PICU admissions known to be HIV infected per annum has increased from 48 (14.5%) in 1993 to 132 (33.4%) in 2000, despite attempts to restrict the numbers.¹¹ Care for HIV infected children has been limited to those in whom a better outcome is presumed. However, the appropriate selection of these cases creates a number of ethical dilemmas and is a cause of considerable anguish. The decision on whether or not to admit a child is the result of careful consideration of the available

There are approximately 2.8 million children living with HIV/AIDS worldwide. Over 90% of these children live in sub-Saharan Africa,¹ where resources and health care are most limited. There has been a dramatic decrease in the numbers of HIV infected children requiring admission to the intensive care unit (ICU) in resource rich countries due to the prevention of mother-to-child transmission and the use of highly active antiretroviral medication.² Respiratory tract infections are found in over 90% of HIV infected African children at post-mortem³ and account for 30–40% of paediatric inpatients admissions in HIV endemic regions with case fatality rates of between 15–28%^{4–5} (see table 1). With 80 000 newly HIV infected children born annually in South Africa,⁶ the demands on paediatric intensive care services are potentially overwhelming. Questions are faced daily regarding the admission to paediatric ICU (PICU) and ventilation of these children. This paper discusses the challenges facing intensive care paediatricians in developing countries with

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Abbreviations: ART, antiretroviral treatment; ELISA, enzyme linked immunosorbent antibody assay; ICU, intensive care unit; KEH, King Edward Hospital; MTCT, mother-to-child transmission; PCP, *Pneumocystis carinii* pneumonia; PICU, paediatric intensive care unit.

Table 1 Survival rates from the literature of various combinations of HIV and other diseases

	Mortality rate (%)
HIV related acute LRTI in Africa ^{4,5}	15–28
HIV related ARF + ventilation ^{21,22}	19–50
HIV related ARF + ventilation + PCP ^{23,24}	40–100
HIV + ventilation ²⁷	53
HIV + PICU 1996, Durban ¹⁰	100
HIV + PICU 1998, Johannesburg ²⁹	88
HIV + PICU 2001, Cape Town ³⁰	29
Developed world 3 month mortality ^{26,27}	10–32
Developed world 32 month mortality ^{23,24}	40–100

LRTI, lower respiratory tract infection; ARF, acute respiratory failure; PCP, *Pneumocystis carinii* pneumonia; PICU, paediatric intensive care unit.

scientific data and empirical assessment of the potential outcome for the individual child.

PROBLEMS/CHALLENGES

Diagnostic problems

1. Diagnosis of HIV in infancy on the PICU in resource poor settings

The majority of PICU admissions are under one year old—an age when it is difficult to diagnose HIV in resource poor settings. Enzyme linked immunosorbent antibody assay (ELISA) for HIV is not able to distinguish between true infection and the vertical passage of maternal antibodies. Polymerase chain reaction for HIV is required to confirm HIV infection under 15 months but is technically more difficult and not widely available. Clinical suspicion of HIV with a positive ELISA is predictive of HIV infection in over 85% of paediatric inpatients in an endemic HIV region.¹² Hence, in this setting it is more cost effective to assume infection on clinical grounds and ELISA.

HIV is suspected for the first time in the majority of infected infants admitted to the PICU.¹³ *Pneumocystis carinii* pneumonia (PCP) is reported to be the AIDS indicator disease in over 40% of these infants.^{14,15} Although PCP is often suspected, confirmation of the diagnosis is often not possible due to limited invasive testing and laboratory services in resource poor environments.

2. HIV counselling Issues

Pre-test HIV counselling on the PICU requires additional skills as staff members who counsel must be able to deal with the issues around intensive care and the implications of a possible positive HIV test. A positive HIV result in an extremely ill child—whether related to the presenting problem or not—may have a significant impact on the level of care provided and on the outcome of case, especially if the prospect of obtaining long term antiretroviral therapy is not apparent. Parents may give consent for HIV testing in a desperate bid to assist their ill child, but without careful consideration of the implications of the tests on themselves. The window of opportunity for testing is short as children may die rapidly and parents do not have time for deliberation. It is emotionally exacting to face the prospect of the death of a loved one and then to be told that you are also HIV infected. Counselling in this context is therefore more time consuming (approximately 30–60 minutes) and therefore more costly. Fear of a positive result may override any decision for testing in the child. In the neonatal intensive care unit (NICU) at KEH, Durban, 30% of HIV infected mothers diagnosed during routine antenatal testing refused HIV testing on their baby. Post-test counselling in the PICU also presents challenges. Parents are often overwhelmed by the illness in their child and do not fully appreciate the impact of

a positive HIV result. This is even worse when the child dies, as they have to make funeral arrangements.¹⁶ The psychological impact of this overrides any logical understanding of a positive HIV result and, based on this and our experience at KEH, we schedule an appointment six weeks after the ICU discharge or death to discuss all ICU related matters including HIV results.

3. Standard of care for HIV infected children admitted to PICU

In developed countries the management of HIV infected children during and after their PICU stay has evolved through three stages.¹⁷ Initially, symptom management was used as no prophylaxis or antiretroviral were available. Then the use of antibacterial and PCP prophylaxis became standard practice. More recently the use of antiretrovirals, including HAART, has become routine during or soon after discharge from PICU.

In contrast, in most developing countries, the care of HIV infected children is limited to the acute management of opportunistic infections without recourse to either prophylaxis or antiretrovirals. Despite the proven benefits of prophylactic co-trimoxazole only 43% of HIV infected children admitted with lower respiratory tract infections to the tertiary referral center in Cape Town had received PCP prophylaxis.¹⁸

The American Academy for Paediatrics recommends pneumococcal vaccination for HIV infected children; however there have been concerns that the carbohydrate vaccine is ineffective and could actually increase pneumococcal disease.¹⁹ The newer pneumococcal conjugate vaccine had an efficacy of 55% in HIV infected children in Soweto but availability may be limited by cost.²⁰

Antiretroviral therapy (ART) is currently unavailable in the public health sector except for prophylaxis for mother-to-child transmission (MTCT), rape survivors, and needle injuries. This limitation was based on the lack of political will, the limited health infrastructure, and the estimated high cost to implement a comprehensive programme. The success of the programme using nevirapine for the prevention of MTCT has encouraged the government to reconsider its decision. On the 19 November 2003, the South African cabinet announced its ART rollout plan and pledged an amount of 3.3 billion rand for the programme, which could significantly alter the prognoses of children with PCP requiring IPPV.^{7,21} It must be recognised that such a rollout will be gradual in order to allow for the health infrastructure to be adequately built up. Therefore, despite this commitment, it might take several years before all the eligible children at this particular hospital can receive ART.

OUTCOME OF HIV INFECTED CHILDREN REQUIRING MECHANICAL VENTILATION

Differences in entry and outcome parameters reported in the literature make comparison of the limited available data difficult. In industrialised countries survival rates of HIV infected children who require ventilation are higher for non-respiratory than respiratory conditions (78% v 47%).¹⁸ Infants ventilated for HIV related acute respiratory failure had ICU survival rates of 50–81%.^{22–24} PCP is the commonest AIDS related disease for which ventilatory support is needed and has the worst outcome. The prognosis is better in the absence of PCP, or in those who had PCP with another associated illness, or in those children where treatment for PCP was instituted less than five days before needing ventilation. The overall median three month survival varies between 68–90% while medium term survival is between 0–60%.^{25,26} A recent review of admissions before the routine availability of HAART, from Great Ormond Street Hospital, London

indicated a two year mortality of 87.5% in those ventilated for PCP ($n=16$) and there were no deaths in children not requiring mechanical ventilation. So even in resource rich societies, ventilating children with PCP is not necessarily an obvious treatment option. Data for developing countries are limited. African children with HIV infection have a 26–45% mortality rate by their first birthday and 35–59% by their second. Very few children survive until their fifth birthday.²

What about South African children with HIV infection requiring ventilation? Four reports have described the outcome of HIV infected children in South African ICUs. The first two were before the routine use of co-trimoxazole and steroids for PCP. The first report in 1996 from Durban reported 100% mortality in children with AIDS compared with a 54% mortality in matched controls ($p<0.001$).²⁷ Mortality rates were similar among uninfected children, those with symptomatic HIV, and those infected but presenting with HIV unrelated diseases. The second report in 1998 from Johannesburg combined all symptomatic HIV infected children and compared them with HIV uninfected children. The mortality among infected children without the use of corticosteroids and intravenous cotrimoxazole was 88%, compared with 31% in HIV uninfected children ($p<0.05$).²⁸ The paediatric risk of mortality (PRISM) score in this study was a poor predictor of outcome in the HIV infected group. The third report in 2001 from Cape Town reported an in-hospital mortality rate of 28.5% in HIV infected children compared with 14.5% in non-infected children.¹³ The lower mortality in this study may be related to the ICU admission criteria as only 42% of the children admitted were ventilated. Recently a study from KwaZulu Natal, South Africa showed no significant differences in the survival rates of HIV infected children with acute lower respiratory tract infection requiring mechanical ventilation and those treated conservatively due to lack of ICU facilities.¹²

ETHICAL OR PRAGMATIC DECISION MAKING

There are at least three main ethical questions which this scenario poses, and which we will look at in turn:

1. Are there clinical and moral reasons for admitting HIV positive children with PCP to the PICU?

An initial answer to this question might be “yes”, as physicians have a deontic “duty to care” for all patients in order to fully respect them as ends-in-themselves. Nevertheless, there must be reasonable limits on this duty, as all people will die at some point. The clinical data currently available suggest that the prognosis for HIV positive children with PCP who require ventilation is not encouraging, and some might argue that it is medically futile to treat such children. Nevertheless, two points must be noted here. One is that the prognostic data mentioned earlier are based on a scenario of no access to antiretroviral treatment and the South African government has recently committed itself to providing antiretrovirals in the public health sector. The second point is the enormous burden of this disease in children. For example, if we say that between 0–60% of HIV positive children ventilated for PCP demise within the ICU, we cannot ignore the fact that up to 40% of those children survive in the medium term. Although this may seem to be of little significance to a small sample of children, on the current scale of the burden of disease in South Africa this could amount to a significant number of children.²⁵ Even leaving aside the physicians’ traditional reliance on the “duty to care”, thoughtful utilitarian calculations measuring utility beyond the value of that child’s life to its caregivers, or its potential to contribute economically to society come into play. Factors such as social malaise and lack of investor

confidence in South Africa as a result of its perceived abandonment of HIV positive children contribute to the social utility that must be calculated. We cannot simply express such lives as units measuring the success or failure of medicine. A reasonable answer to the question as to whether or not HIV positive children with PCP should be admitted to PICU is that the situation is in a sufficient degree of flux as to make any decision, in principle, override the “duty to care”. This conclusion fails to address the impossible implications of urging a deontic default position of treating every possible person: there simply are not the resources to do so. It leaves open the debate as to whether or not the state should spend its limited resources on increasing its capacity for such endeavours. These are the issues we will now turn to discuss.

2. Macro-allocation: should more resources be committed to caring for HIV positive children with PCP who require PICU?

There are at least three levels of considerations here:

- In the national budget, should more money be allocated to the health budget?
- In the health budget, should more money be spent on HIV/AIDS treatment and care?
- In the vote on the AIDS programme, should more money be spent on upgrading and expanding facilities and staff for PICU?

Each question has sufficient scope for an entire paper, so we shall make some general comments here about macro-allocation in this context, and the kind of tools one might wish to rely on in making these decisions. Leaving aside libertarian and egalitarian assumptions that the enforced transference of social goods like health are only legitimate if the recipients have a moral right to the good, we continue in the deontological vein of the previous section by starting with South Africa’s Constitutional Bill of Rights. Section 27 of the Constitution guarantees, among other things, that: “Everyone has the right to have access to health care services”... [and]... “No-one may be refused emergency medical treatment. Section 28¹ (c) claims that every child has the right to “basic health services”.²⁹ Taking this at face value, it would appear that we are obliged to make available as many resources as are needed to provide basic and/or emergency medical care.

Two problems arise here: both of which are recognised by the Constitutional Court. One is simply the impracticality of such a position. To provide for all emergencies would probably mean taking resources away from other health areas, education, welfare, defence, and so on. Even if we did so, we would discover that resources are neither finite or infinite, but are rather indefinite, in that any budget may be increased if other budgets are “traded off against it”.²⁹ The question ultimately has to be not, “shall we ration?”, but rather, “how shall we ration?”,³⁰ because health needs are “virtually limitless”.³¹

The second problem with the Constitutional provision is in defining what constitutes “access” to health care (S27), “basic” health services (S28), or an “emergency” (S27). The importance of the provision of “access” can be seen in the distinction between “first generation” and “second generation” rights, a distinction that was heavily relied on in the Grootboom case.³³ First generation rights, like the right to life, are said to require no or little direct resources from the state in ensuring their fulfilment. Second generation rights (like the Constitutional rights to housing, education, and health), can require significant state resources, and it is thus incumbent on the state to prove only that it is “progressively realising” these rights in order to fulfil its duty. If the state

could thus prove that it is improving its healthcare facilities, little else could apparently be expected of it, even if some health needs are not being met. "Access" to health care could thus be interpreted to mean that one should not be prevented from obtaining health care, although there is no positive duty on the state to provide one with the required health care.³²

Defining "basic" health needs is much more difficult. One obvious way of thinking about this is the most fundamental end of medicine: "keeping one alive". In this regard, admission to the PICU for ventilation would be seen as basic health care. However, ventilation (or any ICU care) requires sophisticated machinery, resources, and training that can scarcely be called "basic". Relying on the category of "basic" health care implies a two tier system. Dworkin, a political philosopher defined basic health care as anything that "ideal prudent insurers" would be prepared to insure against—care outside this falls into the second tier of health care, affordable to those who have the means.³⁴ Given the burden of disease of HIV in South Africa, ideal prudent insurers should certainly want to insure themselves against treatment for HIV infection. This, Dworkin would argue, justifies the state using taxpayers' money to provide this service.

There is also the controversy around defining "emergency" medical treatment. In 1998, the South African Constitutional Court ruled on the case of a Mr Soobramoney, who applied for state sponsored renal dialysis based on the Constitutional provision that no-one may be denied emergency medical treatment.³⁵ In its deliberations, which ultimately denied Soobramoney the right to make this claim, the Constitutional Court ruled that emergency medical care covered "sudden catastrophes", not the treatment of terminal illnesses.³⁵ Based on this, one could not appeal to the Bill of Rights for changes in macro-allocation policies which would allow paediatric PCP patients requiring admission to PICU to receive ventilation, as this need is foreseeable and thus not a "sudden catastrophe". The Constitutional interpretation of "emergency treatment", however, may be an unacknowledged way of trying to bypass the necessary inflexibilities of a deontological system by interpolating some utilitarian ways of thinking, as people who are terminally ill are not likely to maximise utility upon treatment of their condition.

The more explicit utilitarian tools that are frequently employed to determine macro-allocation policies are those of Quality Adjusted Life Years (QALYs), Disability Adjusted Life Years (DALYs), as well as cost effectiveness analyses (CEA), and cost benefit analyses (CBA).³² In true consequentialist fashion, these approaches all pose the same question: "Do the ends justify the means?" It does not seem wise to dedicate significant amounts of resources to all HIV positive children with PCP who require ventilation, especially if this is to the detriment of other children who score higher on the above consequentialist analyses. Despite this, the ethical and clinical facts have a sufficient degree of uncertainty to make it prudent to consider allowing at least some children into the PICU. Selecting such children will have to be done using some kind of cost-benefit analysis and this shall be briefly discussed below.

3. Micro-allocation: how can we morally choose between candidates for PICU?

One common way of reviewing this, would be to say: "the greater the capacity to benefit, the greater the need";³² the greater the need, the more deserving is the case. Nevertheless, it remains important to distinguish between the need for health and the need for health care as not everyone will benefit from health care (although everyone will benefit from health).³⁰ Such a definition is useful for understanding the concept of triage.

Triage is a method of micro-allocation whereby candidates for treatment are sorted into three groups: firstly, the people whose chance of survival would be poor even with treatment; secondly, people whose survival would be guaranteed with treatment; and thirdly, people who would survive without treatment. Using both CEAs, and CBAs, it seems most sensible that the group that should receive priority treatment is the second one. Although triage may be objectionable to some, in its defence it is a systematic (and thus at least procedurally fair) way of coping with situations of limited resources. It also carries the recognition that heroics are sometimes inappropriate.

Similarly, the Royal College of Paediatrics and Child Health (RCPCH) guidelines state that there are five situations where ICU care could be denied to children.³⁶ These include: the child who is brain dead; the child in a permanent vegetative state for more than six months; the "no chance" situation where the child who has such severe disease that life sustaining treatment simply delays death without significant alleviation of suffering; the "no purpose" situation where child may be able to survive with treatment, but the degree of physical or mental impairment will be so great that it is unreasonable to expect them to bear it; and the "unbearable" situation where the child and/or the family feel that in the face of progressive and irreversible illness further treatment cannot be endured.

HIV positive children who require health care could fall into any of the three triage groups. If one thinks of the lifespan of an HIV positive person as a spectrum, and superimposes that image on the triage model, one can see how an HIV positive person might move from one group to the other over the course of her life. The data presented above indicated that, without antiretroviral therapy, HIV positive children with PCP requiring ventilation stand little chance of long term survival. This fact would seem to place such children in the first triage group, or, to use the Royal College phrase, in a "no chance" situation. The same would be true of HIV positive children with extra pulmonary related diseases or intractable diarrhoea, and evidence would suggest children with AIDS encephalopathy, cardiomyopathy, or severe intolerable weight loss would satisfy the "no purpose" situation as there is 80–100% mortality within 6–8 months.^{37 38} According to the RCPCH guidelines, then, it could be argued that on ethical grounds none of these groups should be offered mechanical ventilation. Thus for children in South Africa a selective approach to the admission of HIV infected children to the PICU might be appropriate. However currently the evidence is not available to decide which criteria should be used to confidently deny admission.

CONCLUSION

The harsh reality is that those working in PICUs have to make difficult personal decisions and effectively triage admissions to paediatric intensive care. Who are the most likely to survive on the best evidence available? If ventilation is not life saving then pragmatic adherence to a policy of refusal to offer ventilation to such individuals has to be followed. Until such time that more resources to practice at optimum levels become available, paediatric intensive care medicine in South Africa cannot afford the luxury of a deontological approach to care. Even though one would want to treat everyone equally and feel that one has a duty to offer the best intensive care to all, it is not practical. In developing countries a much more utilitarian view has to apply. To discharge a child from a PICU and have him develop a handicap or die soon after is not a triumph for hi-tech medicine.

Ethical angst arises from the concern that by refusing care we are practising paternalism under the guise of evidence

based medicine. These decisions run contrary to the tenet of non-maleficence. Even if poor, disadvantaged children had recourse to the Human Rights Acts and claimed their Right to Life, who would fund their time on PICU? Who would explain the subsequent lack of funds to keep beds open for other children with non-HIV life threatening diseases that also require mechanical ventilation? There are currently very few data on the cost of providing PICUs in developing countries. Would it be more profitable to use these resources in other ways, such as primary healthcare programmes? Refusing to ventilate HIV infected children and then redirecting the money saved into an education programme aimed at preventing neonatal acquisition of HIV by trying to reduce mother-to-child transmission in South Africa and other resource poor countries would be a truly utilitarian act.

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